REMARKS

These remarks address the Examiner's comments made in the Office Action mailed 09/22/2004.

Objection to Drawings

The drawings have been objected to under 37 CFR 1.83(a).

Figs. 1 and 4 have been corrected via the enclosed replacement sheets.

112 Rejection

Claims 1-22 have been rejected under 35 USC 112 second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention.

Claim 1

The office action states that it is unclear, in claim 1, how a slipper clutch using a sprag "would provide anything other than a frictional coupling." Sprags are well known in the industrial drive mechanism art.

Applicant notes that claim 1 recites that "the slipper clutch provides positive coupling of torque from the gearbox output shaft to the slipper clutch output shaft and at least some amount of slip in response to back-torque" (emphasis added). The term "positive coupling" does not limit the claimed structure to only those which use other than frictional coupling. Indeed, a sprag relies on a truly extreme level of friction caused by the radial wedging of multiple steel sprags against an inner race and an outer race, to provide positive coupling. Indeed, if enough torque is applied against a sprag clutch in the lockup direction, the sprags can be made to slip, but, with commercially common sprag clutches, this amount of torque is truly enormous, and the steel races will typically explode long before the sprags slip. The basic operating principle of a sprag is that the more torque is applied, the harder the sprags press radially against the races, and the higher the coefficient of static friction becomes.

"Positive coupling" is not limited to e.g. mechanical coupling such as with splines or bolts. Rather, the claim should be interpreted to mean that, within the physical limits inherent

within an engine's clutch system, the slipper clutch locks up in one direction, and freewheels in the other direction, whether the lockup is provided by frictional coupling, mechanical coupling, or otherwise.

A simple explanation of sprag clutches is offered at http://www.renoldusa.com/renold/clutches/sprag/general.html, which states, in pertinent part, that:

> A Sprag Clutch is a free-wheel device having an inner race, which can be either the input or output member, and an outer race.
>
> The input member can be arranged to drive the output member in a chosen direction and will then be able to over-run in the opposite direction and/or permit the output member to over-run in the same direction. ...
>
> In simple form the Sprag Clutch consists of a full complement of shaped steel sprags or wedges, located in the annular space between concentric inner and outer races. Power is transmitted from one race to the other by the wedging action of the sprags between them. Each sprag is so shaped that dimension AA is greater than BB. Rotation of one race in the 'driving' direction causes the sprags to tilt, thus transmitting the torque in full from one race to the other. Conversely rotation of the race in the other direction frees the sprags and permits over-running between the races.
>
> A tilting force F keeps the sprags in light contact with both inner and outer races. There is thus no lost motion, the driving torque being instantaneously transmitted between races. Various spring arrangements are used to provide force F, a typical one being an expanding coil spring as shown in the diagram above. In any clutch of this type, the transmitting capacity must be dependent on the total load carrying area. The Renold Sprag Clutch is so designed that the maximum possible number of sprags can be accommodated; thus it will transmit a greater torque in relation to its size and weight than any other comparable type of clutch.

Applicant respectfully submits that claim 1 does particularly point out and distinctly claim the invention, and requests withdrawal of the objection.

Claims 8 and 16

The office action states that it is unclear, in claim 8 and claim 16, "if the output shaft and the primary drive output refer to the output of the gearbox."

Applicant points out that neither claim 8 nor claim 16 recites a gearbox. They are silent regarding gearboxes.

The invention can be used in e.g. single-gear vehicles which do not have gearboxes. If the vehicle has a gearbox, applicant's slipper clutch invention could be located either between the driven wheel and the gearbox, or between the gearbox and the engine (or, perhaps more to the point, between the gearbox and the primary clutch); in either location, the slipper clutch will provide positive engagement for the engine to drive the driven wheel, and slipper engagement to limit the amount of back-torque transmitted from the driven wheel to the engine (or, perhaps more to the point, the primary clutch), e.g. when the throttle is being closed.

Applicant points out further that the recitation in claims 8 and 16 that the primary clutch, driven wheel, and slipper clutch are all "coupled to" the output shaft does not mean that any of them is necessarily coupled directly to the output shaft, only that there is a mechanical connection between them via the drive train.

Applicant respectfully submits that claims 8 and 16 do particularly point out and distinctly claim the invention, and requests withdrawal of the objection.

103 Rejection over Kajitani and Friedmann

Claims 1, 4-8, 14-17, and 19 have been rejected under 35 USC 103(a) as unpatentable over U.S. Patent No. 5,501,310 to Kajitani et al. in view of US Patent No. 5,139,124 to Friedmann.

Claim 1 recites three shafts: a crankshaft, a gearbox output shaft, and a slipper clutch output shaft. Kajitani teaches exactly two shafts: crankshaft 2, and transmission input shaft 35. Friedmann teaches exactly two shafts: crankshaft 5, and transmission input shaft 10. Claims 1 and 4-7 simply do not read on Kajitani and Friedmann, taken separately or together.

Applicant respectfully submits that it Kajitani and Friedmann each teaches a single clutch, not a gearbox clutch and a separate slipper clutch as recited in the claims. Indeed, Kajitani's entire clutch mechanism is contained within a single clutch basket 30 which is coupled to a single input shaft (crankshaft 2) and a single output shaft (transmission input shaft 35), and nearly the entire Friedmann clutch mechanism is contained within a single clutch basket 27

which is coupled to a single input shaft (crankshaft 5) and a single output shaft (transmission input shaft 10). Both fall squarely into the category of the sort of unitary "clutch with slipper function" which represents the very prior art whose fundamental problem the present invention solves.

The office action states that Kajitani discloses "a primary clutch (60), a positive engagement one-way clutch (68, Fig. 2), a crankshaft (51), a gearbox output shaft (49), a slipper clutch () [sic], a clutch basket (60a), a stack of drive plates (67), a spring (71), an adjustable (Col. 7, 62-65) tensioner (75). Kajitani discloses a mechanically distinguishable slipper clutch, but does not show a remotely placed slipper clutch."

The Examiner's choice of words, "remotely placed slipper clutch", is particularly instructive, in light of the fact that Friedmann's friction clutch and slip clutch are separated, at their most distant point, by what appears to be millimeters at best, and in fact are directly coupled to each other at many points.

The office action states that Friedmann "discloses a clutch assembly for a longitudinally mounted engine having a slipper clutch (14) separate from a primary clutch (7)."

One skilled in the art, if attempting to limit undesirable effects of back-torque in a motorcycle (or other vehicle), would not consider using Friedmann's invention, alone nor in combination with Kajitani's invention. Friedmann's slipper clutch is not designed to prevent heating and wear of the primary clutch, nor to reduce engine braking. Friedmann's "slip clutch" 14 is located immediately adjacent to and shares common components with his "friction clutch" 7. Slipper operation of his slip clutch will actually increase the heat in the friction clutch. His slip clutch is engineered to smooth out short-duration (fractions of a second) torque fluctuations, not to reduce back-torque from the driven wheel to the other drive train components. In his own words, it is designed to "compensate for any and all fluctuations of torque which is transmitted by the internal combustion engine of a motor vehicle to the input shaft of a change-speed transmission". (col. 2 lines 14-17).

Most significantly, Friedmann's slip clutch is "preferably designed in such a way that torque which is transmitted by the slip clutch 14 is the same regardless of whether the vehicle is driven or coasting, i.e. regardless of whether the flywheel 3 drives the flywheel 4 or vice versa."

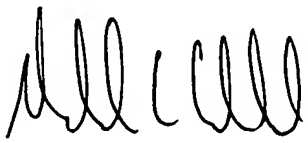
(col. 14 lines 10-14). Thus, Friedmann expressly teaches away from a slipper clutch which "provides positive coupling" (as recited in claim 1), provide "a positive sprag engagement of torque" (as recited in claim 8), or "provide positive torque transfer" (as recited in claim 16 as amended) when the engine is driving the driven wheel.

As near as Applicant can tell, Friedmann is silent with respect to engine orientation.

CONCLUSION

Applicant respectfully requests allowance of all claims, as they are neither anticipated nor made obvious by the references cited.

Respectfully submitted,



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